THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 31

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHE-CHIA WEI

Appeal No. 95-2928
Application 07/769,185[1]

HEARD: Jan. 13, 1998

Before KRASS, JERRY SMITH, and FLEMING, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 18 through 38. Claims 1 through 17 stand withdrawn as being directed to a nonelected invention.

The invention pertains to improvements in integrated circuit FET structures. More particularly, the invention employs HALO and LDD diffusions near the transistor

channels, where they perform their useful function of solving the hot electron effect problem, as was known in the prior art. Additionally, however, the HALO implant is excluded from other portions of the active regions such that junction capacitances are lowered in those regions, resulting in faster switching speed.

Representative independent claim 18 is reproduced as follows:

18. A field effect transistor for an integrated circuit device, comprising:

a substrate region having a first conductivity type;

a gate electrode over said substrate region;

lightly doped drain regions in said substrate region adjacent said gate electrode, said lightly doped drain regions having a second conductivity type;

heavily doped source/drain regions having the second conductivity type in said substrate region adjacent said lightly doped drain regions; and

halo regions having the first conductivity type within said substrate region adjacent said gate electrode and extending a relatively short distance into said source/drain regions, wherein those portions of said source/drain regions which are spaced further from said gate electrode than the relatively short distance do not contain the first conductivity type dopant used to form the halo regions.

The examiner relies on the following references:

Liou et al. (Liou)	4,771,014	Sep. 13, 1988
Bergonzoni	4,968,639	Nov. 6, 1990

[1] Application for patent filed September 30, 1991.

Lineback, J.R., "Triple Diffusion Doubles RAM Speed", Electronics, pp. 54, 61, (1983).

Claims 18 through 38 stand rejected under 35 U.S.C. ' 103. As evidence of obviousness, the examiner cites Bergonzoni and Liou in view of Lineback.[2]

Reference is made to the briefs and answer for the respective positions of appellant and the examiner.

OPINION

We have carefully considered the evidence before us, including, inter alia, the arguments of appellant and the examiner, the declarations of Dr. James Cunningham and the applied references and we conclude therefrom that the instant claimed subject matter would not have been

[2] Because of a reference to a patent to Cham in the examiner's communication of February 9, 1995 (Paper No. 18), appellant questioned, in the supplemental reply brief of March 9, 1995 (Paper No. 20) whether a new ground of rejection , relying on Cham, was possibly being applied. However, the examiner made clear, in Paper No. 22, of April 17, 1995, that no new ground of rejection is made and that Cham was referenced only to show that masked implants were known in the art even though, in the examiner's view, "the method of masked implantation used as evidence by Appellant in the Declaration and the Reply Brief is not at issue here, only the structure claimed" [Paper No. 18]. Accordingly, Cham is not relied upon by

obvious, within the meaning of 35 U.S.C. ' 103, based on such evidence.

Taking independent claim 18 as exemplary (independent claims 23 and 31 include similar, but not exact, language), the limitation of particular interest herein is

> wherein those portions of said source/drain regions which are spaced further from said gate electrode than the relatively short distance do not contain the first conductivity type dopant used to form the halo regions.

Both parties agree that neither of the Bergonzoni or Liou references discloses or suggests that the halo regions should be formed only in the area adjacent the gate electrode since the halo region 13' in Bergonzoni appears to underlie all portions of n+ drain region 31 and LDD region 19' while, in Liou, nothing appears to suggest that the halo region be restricted to the gate electrode area.

The examiner relies on Lineback, specifically the figure at the top right on page 54, to show that it was known to establish a halo region, shown with conductivity p around the gate electrode region while the remainder of the source and drain regions, heavily doped n+ regions,

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the examiner and will not be considered by us in the

do not contain any of the p-conductivity type dopant used to form the halo regions.

Appellant disputes the examiner's interpretation of Lineback and contends, via arguments and the Cunningham declarations, that there is no suggestion in Lineback that the dopants which make up the halo regions would be excluded from the rest of the source/drain area and that there is no suggestion anywhere in Lineback that a masked halo or LDD implant, which would exclude such diffusions from most of the source/drain area, should be used. Appellant further contends [page 4, principal brief] that the Lineback drawing does not show the extent of the halo diffusion inside the n+ source/drain area "because the n+ diffusion is deeper and heavier and would swamp the dopant" of the halo diffusion.

We see no problem making the combination of Lineback with the teachings of Bergonzoni and Liou, the motivation being provided by the advantages taught by Lineback for his structure, even if the purpose was not for appellant's purpose. The problem we do find, however, is that even if we combine the teachings of these references, the combination does not result in the

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decision herein.

claimed subject matter because Lineback does not clearly suggest that the further spaced apart portions of the source/drain regions do not contain the first conductivity type dopant used to form the halo regions.

The instant claims are drawn to structure, rather than to a method of fabricating the structure and, so, normally, we would not be concerned with a mask implantation step which results in the claimed structure where the step apparently forms no part of the claim and the prior art apparently discloses the same structure. Determination of patentability in "product-by-process" claims is based on the product itself, even though the claims may be limited and defined by a process, and thus the product in such claims is unpatentable if it is the same as, or obvious from, a product of the prior art, even if the prior product was made by a different process. In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985).

However, the claims before us recite a specific characteristic of the structure, i.e., that the portions of the source/drain regions which are spaced further from the gate electrode do not contain the first conductivity type dopant used to form the halo regions. This

characteristic is brought about because of the masking implantation steps of the process of making the claimed structure. If the structure of Lineback can be shown to possess this characteristic, even if not brought about through a similar process, then we would agree with the examiner as to the obviousness of the claimed subject matter.

While, at first blush, the structure of Lineback appears to show the claimed limitation, since no p-conductivity type dopant is shown within the heavily doped n+ regions constituting the source/drain regions, in our view, appellant has made a cogent case, through argument and the Cunningham declarations, for the proposition that it was conventional not to mask the halo or LDD implants. If it was conventional not to so mask these implants, then, in the absence of a specific teaching to the contrary by Lineback, it would appear reasonable to us, on weighing the arguments of appellant and the examiner, that Lineback did not contemplate making the disclosed structure in any manner other than the conventional manner, i.e., without masking the halo and LDD implants.

Accordingly, while the examiner has presented a well-written answer, clearly setting forth a not unreasonable rationale for a finding of obviousness, since the examiner has pointed to nothing but the general drawing in Lineback to suggest that Lineback's structure has the claimed property of certain portions of the source/drain regions not containing the first conductivity type dopant used to form the halo regions and there is nothing in Lineback's descriptive portion to indicate that the structure was formed in any particular manner which would have necessarily resulted in a structure having the claimed characteristics, on balance, we find ourselves in agreement with appellant that the claimed subject matter would not have been obvious within the meaning of 35 U.S.C. ' 103.

The examiner’s decision rejecting claims 18 through 38 under 35 U.S.C. ' 103 is reversed.

REVERSED

Errol A. Krass Administrative Patent Judge	)	
Jerry Smith Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
Michael R. Fleming Administrative Patent Judge	)	

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